Transgenerational Effects in the Progeny of Mice Exposed to Acute High and Chronic Low Dose-rate Gamma-rays – Germ Cell Mutation Analyses–

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Abstract

Transgenerational effects of low dose-rate (LDR) radiation have not been well studied. We have been analyzing the incidence of copy number aberrations in the progeny of male C57BL/6J mice continuously exposed to LDR (20 mGy/day, 1mGy/day, 0.05mGy/day) gamma-rays for 400 days (total respective doses: 8000 mGy, 400 mGy, 20 mGy) and to high dose-rate (HDR, 770 mGy/min) gamma-rays (total dose: 3000 mGy). This year, we analyzed 13, 31, and 16 progenies from the parents in the HDR-irradiated group, the 20 mGy/day LDR-irradiated group, and the non-irradiated group, respectively, using oligo-microarray CGH (Agilent Technologies). The accumulated data of the 20 mGy/day LDR-irradiated group and the non-irradiated group were deposited into the Gene Expression Omnibus (GEO), a public genomics data repository in the National Center for Biotechnology Information (NCBI).

Table 1 Accumulated results of the detection of Type L aberrations by oligo-microarray CGH

		No. of mice examined using oligo-microarray assay	No. of mice with type L aberrations (percentage)	
20 mGy/day (Total dose 8000 mGy)	Female	67	9	(13.4%)
	Male	75	13	(17.3%)
	TOTAL	142	22	(15.5%)
1 mGy/day (Total dose 400 mGy)	Female	35	2	(5.7 %)
	Male	25	3	(12.0%)
	TOTAL	60	5	(8.3 %)
0.05 mGy/day (Total dose 20 mGy)	Female	21	1	(4.8 %)
	Male	25	0	(0.0 %)
	TOTAL	46	1	(2.2 %)
770 mGy/min (Total dose 3000 mGy)	Female	15	1	(6.7%)
	Male	22	2	(9.1%)
	TOTAL	37	3	(8.1 %)
Non-irradiated	Female	81	5	(6.2 %)
	Male	75	4	(5.3 %)
	TOTAL	156	9	(5.8 %)

Table 2 Accumulated results of the verification of aberrations by TaqMan Copy Number Assays

	No. of probes with aberrations	No. of aberrations detected by oligo-microarray CGH		No. of aberrations verifed by TaqMan® Copy Number Assays	
		Non-irradiated	20 mGy/day	Non-irradiated	20 mGy/day
Type L		9	22	9	22
Type S	≥5	1	5	1	5
	4	1	3	0	1
	3	3	2	1	1
	2	12	8	3	2
	Total	17	18	5	9
TOTAL (Type L +S)		26	40	14	31